REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

The Examiner objected to claims 4 and 5 due to formalities. Applicant notes that claim 1 has been amended to define "a first predetermined portion."

The Examiner rejected claims 1-5 under 35 U.S.C. 102(b) as being anticipated by Takenaka et al., U.S. 5,432,417. The Examiner's rejection is traversed for the following reason.

In regards to claim 1, Applicant discloses a control system for a legged mobile robot. The robot includes a base body, multiple link mechanisms connected to the base body, and multiple joints. The link mechanisms move the base body and contact externals. The multiple joints are disposed between the base body and distal portions of the link mechanisms to make the distal portions of the link mechanisms movable with respect to the base body. The legged mobile robot can be operated to a specific motion posture in which the robot is in contact with an external at one or more distal portions of the link mechanisms and a first predetermined portion or portions between the distal portion or portions of one or more specific link mechanisms and the base body. The distal portion of the link mechanism is a portion that is in contact with the external for moving the base body. The first predetermined portion, however, is a portion that is not in contact with the external for moving the base body. The control system includes an external force

detecting means for detecting or estimating an external force acting on the first predetermined portion in the specific motion posture, a desired external force determining means for determining a desired external force, which is a desired value of the external force on the first predetermined portion in the specific motion posture, and a joint controlling means for controlling the displacement of at least a joint existing between the first predetermined portion and the base body such that the detected or estimated external force approximates the desired external force.

Thus, the present invention includes link mechanisms that includes a distal end and a first predetermined portion. When the robot is in motion the distal portion of the link mechanism is in contact with an external to thereby move the robot and the first predetermined portion is not in contact with the external. On the other hand, when the robot is in a specific posture the first predetermined portion is in contact with the external. This feature allows the control system to properly control not only the external forces acting on the distal portions of the legs and arms of the robot but also the external forces acting on other portions of the robot, such as for example, knees, elbows, the trunk, the buttocks, etc. The control system can, thus, maintain the robot in a stable posture when the robot is in motion. Further, the control system maintains the robot in a stable posture when the robot moves from one posture to another posture. For example, if the robot is kneeling on it's knees or sitting on it's buttocks and the robot rises to it's feet, the control system controls the external forces to not only the distal portions of the link mechanism but also to the first predetermined portion to control the stability of the robot while the robot rises from the kneeling or sitting position to a standing position. Similarly, the control system also controls the stability of the robot if the robot moves from a standing posture to

another posture such as a sitting or kneeling posture.

Takenaka discloses a locomotion control system for a mobile robot. Specifically, Takenaka discloses a control system to allow a biped robot to walk with stability over terrain with unexpected irregularities. The robot has two legs whereby each leg has six joints or axes and foot members that contact the ground. Takenaka, however, does not disclose or suggest a condition where the control system controls the stability of the robot when other portions of the robot, such as for example, knees, elbows, the trunk, the buttocks, etc. contact the ground. Accordingly, Takenaka does not teach all the features of claim 1. More specifically, Takenaka does not teach "the legged mobile robot being able to be operated to a specific motion posture in which the robot is in contact with an external at one or more distal portions of the link mechanisms and a first predetermined portion or portions between the distal portion or portions of one or more specific link mechanisms among the plurality of link mechanisms and the base body, wherein the distal portion of the link mechanism is a portion to be in contact with the external for moving the base body, and the first predetermined portion is a portion not to be in contact with the external for moving the base body, the control system, comprising: an external force detecting means for detecting or estimating an external force acting on the first predetermined portion in the specific motion posture."

Rather, Takenaka teaches a control system 26 for a biped robot 1, wherein the robot 1 has a body 24 and a left and right leg. Each leg includes six joints or axes including swivel hip joints (10R, 10L), pitch hip joints (12R, 12L), roll hip joints (14R, 14L), knee joints (16R, 16L), roll ankle joints (18R, 18L), and pitch ankle joints (20R, 20L). Foot members 22R, 22L are located at the distal end of each leg. The

hip and knee joints are connected by thigh links (32R, 32L) and the knees joints and ankle joints are connected by crus links (34R, 34L). Thus, the leg links of each leg has six degrees of freedom, so that during motion of the robot the legs as a whole can execute the desired motion by driving the 12 joints (axes) to an appropriate angle. Therefore, the robot is capable of walking freely within a three dimensional space. As mentioned above, however, Takenaka does not disclose or suggest a condition where the control system controls the stability of the robot when other portions of the robot, such as for example, knees, elbows, the trunk, the buttocks, etc. contact the ground. Nor does Takenaka disclose or suggest that the control system can maintain the robot in a stable posture when the robot moves from one posture to another posture.

Further, in his rejection of claim 1, the Examiner identified both the distal portion of the present invention as foot members (22R, 22L) and the first predetermined portion of the present invention as foot members (22R, 22L). As explained above, the distal portion of the present invention are distal portions of the legs, such as feet. The first predetermined portion of the present invention, however, are other portions of the robot, such as for example, knees, elbows, the trunk, the buttocks, etc. Because the Examiner identified the first predetermined portion as foot members (22R, 22L), the Examiner appears to imply that Takenaka does not teach or suggest a first predetermined portion, as required by claim 1 of the present invention.

Based on the foregoing, it is apparent that Takenaka does not teach or suggest a first predetermined portion. Thus, Takenaka does not teach or suggest all the features of claim 1 and therefore cannot be cited as anticipating claim 1.

Therefore, reconsideration and withdrawal of the rejections of claim 1 based upon Takenaka are hereby requested.

Claims 2-5 depend from claim 1, thus, all arguments pertaining to claim 1 are equally applicable to these claims and are herein incorporated by reference.

Further, in regard to claim 3, Takenaka does not teach all the features of claim 3. More specifically, Takenaka does not teach "wherein the specific link mechanisms are leg bodies extended from buttocks connected to the base body through the intermediary of joints, and the first predetermined portion is the buttocks."

The Examiner identified the buttocks or the first predetermined portion of the present invention as the hip joints (12R, 12L) in Takenaka. As explained above, in the present invention the control system controls the stability of the robot when the distal portion is in contact with an external and when the first predetermined portion is in contact with an external. The external, such as the ground, in Takenaka, however, does not contact the hip joints (12R, 12L). Further, the ground reaction force in Takenaka acts only on the foot members (22R, 22L) and not on the hip joints or any other joints. Thus, the hip joints (12R, 12L) cannot be a first predetermined portion as in the present invention. Therefore, Takenaka does not teach all the features of claim 3.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SAT-16655.

Respectfully submitted,

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